International Journal of Forestry and Crop Improvement
December, 2011 | Volume 2 | Issue 2 | 132-136

Research Article

Heterosis studies in pearl millet from diallel analysis

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Abstract : Eight diverse inbreds were crossed in a diallel fashion, including reciprocals, to study the extent of heterosis and to identify superior new inbreds with good combining ability in pearl millet. The magnitude of heterosis varied from cross to cross for all the characters studied. The high magnitude of standard heterosis was observed for grain yield per plant, number of effective tillers per plant, ear head weight and harvest index; while moderate to low heterosis over standard check hybrid (GHB-744) was found for rest of the traits under study. The highest positive heterosis for grain yield per plant over better parent and standard check was observed to be 77.82 and 42.91 per cent, respectively. The cause of heterosis in grain yield might be due to heterosis in its component traits, mainly, ear head weight and harvest index. The crosses *viz*., J-2454 x J-2467, J-2454 x J-2511 and J-2340 x J-2511 displayed high *per se* performance, high positive and significant standard heterosis, heterobeltiosis alongwith high SCA and involved atleast one good combiner parent. Therefore, these crosses may be segregates the favourable segregants in later generations for selection of superior inbred lines in pearl millet.

Key Words : Heterosis, *Pennisetum glaucum*, Diallel, Grain yield

How to cite this Article: Bhadalia, A.S., Dhedhi, K.K. and Joshi, H.J. (2011). Heterosis studies in pearl millet from diallel analysis, *Internat. J. Forestry & Crop Improv.,* **2** (2) : 132-136.

Article Chronical : **Received :** *04.07.2011;* **Revised :** *29.07.2011;* **Accepted :** *15.10.2011*

INTRODUCTION

Pearl millet [*Pennisetum glaucum* (L.) R. Br.] is the most drought tolerant warm-season cereal crop predominantly grown as a staple food grain and source of feed and fodder. It provides nutritionally superior and staple food for millions of people living in harsh environments characterized by erratic rainfall and nutrient-poor soil. In fact, pearl millet is the only suitable and efficient crop for arid and semiarid conditions because of its efficient utilization of soil moisture and higher level of heat tolerance than sorghum and maize (Harinarayana *et al.,* 1999). Pearl millet is a highly cross-pollinated crop with protogynous flowering and wind borne pollination mechanism, which fulfils one of the essential biological requirements for hybrid development. The quantum jump (from 303 kg to 850 kg/ ha) in the productivity of pearl millet was possible mainly through development of hybrids by the utilization of cytoplasmic genetic male sterility system. Burton (1965) was the first to develop cytoplasmic male sterile line Tift 23A.This opened up a new field for hybrid seed production in pearl millet. In India first pearl millet hybrid HB-1 was released in 1965 and subsequently number of promising hybrids have been developed and released for general cultivation. However, the availability of suitable restorer is a limiting factor in the development of hybrids. Though the A4 and A5 sources were found to be highly stable, their utility is restricted due to non-availability of suitable restorers (Rai *et al.*, 2006). Hence, it is necessary to develop new inbred (restorer) lines and isolate the good combining inbreds for commercial exploitation of heterosis in pearl millet. Therefore, selection of parents and crosses for development of new inbred lines is most critical. Hence,

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